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THE COMMERCIAL CLASSIFICATION OF AMERICAN COTTON¹

With reference to the Standards for Grade, Color, and Staple.

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Cotton grading, according to the best historical records, began in Liverpool about 1800. Until a few years ago its practice was limited almost entirely to persons engaged professionally in the cotton trade. Through commercial usage extending over more than a century a system of grading grew up and was adopted by cotton merchants and spinners. Uniform grade names for upland cotton have been in use for many years throughout the American markets. Before the introduction of standards, however, the qualities represented by the names were by no means uniform. On the contrary they have varied in different localities and from year to year, depending upon custom and the average quality of successive crops. Furthermore, since each bale of cotton usually passes through several hands and various markets on its way from farm to mill, spinners have had somewhat different ideas of classification from those obtaining in the country markets.

Official standardization of cotton grades in this country, which began with the permissive standards in 1909 and which has reached

¹ The writer acknowledges many valuable suggestions from William R. Meadows, in charge of the Division of Cotton Marketing, H. C. Slade, F. W. Knight, A. M. Agelasto, E. G. Parker, G. S. Meloy, R. L. Francis, and other members of the Bureau of Agricultural Economics. Orders of the Secretary revising the standards and an explanation of the changes appear in Service and Regulatory Announcements No. 72 of the Bureau of Agricultural Economics.

its latest development in the universal standards, effective August 1, 1924, has tended to simplify and stabilize the whole matter of cotton classification.

ELEMENTS AND PURPOSE OF COTTON CLASSIFICATION.

Utilization of cotton in spinning depends largely upon its classification or, in technical language, upon its *class*. Class is the term used to express both the grade and staple length. Grade itself is a term denoting the composite of: (1) The color, luster, and brightness of the lint; (2) the nature and amount of foreign matter present



FIG. 1.—Samples of cotton displayed for the examination of buyers in a factor's office.

in the lint, such as leaf, dust, or other foreign matter; and (3) the preparation or ginning. The staple length of cotton is the length of its fibers.

By the classification of cotton, it is possible to determine its comparative value, to facilitate the assorting of individual bales into lots of the same grade and staple,² and to expedite trading by afford-

² Such lots are technically described as "even-running," in contrast with either "round" or "average" lots. The terms "even-running" and "average" have been given specialized meanings by the cotton trade, which vary somewhat in different markets. Usually, the cotton exchange or analogous trade organization in each principal center or locality defines in its rules of trading the meanings of the terms as applied in its particular market, and stipulates the extent and degree of permissible deviation from the specified grade or grades. See in this connection: Carolina Mill Rules; New England Terms—Rules for Buying and Selling Cotton; Rules of the New Orleans Cotton Exchange; Rules of the Savannah Cotton Exchange; Trading Rules of the Liverpool Cotton Association; Rules of the Bremen Cotton Exchange; General Rules of the Rotterdam Cotton Association; and others.

ing the purchaser means of buying cotton on description without the examination of actual or type samples.

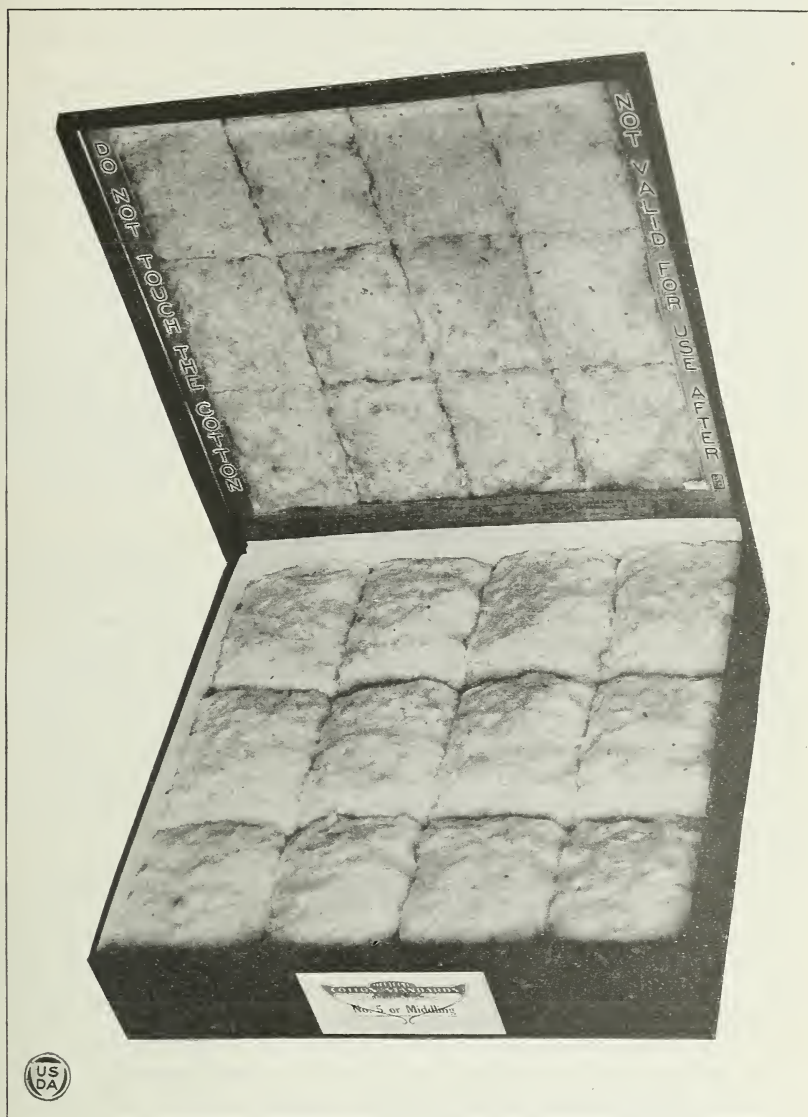


FIG. 2.—Practical form of the universal standards for the grade of Middling. In the upper half is a photograph inserted in the cover of the box to verify the preparation of the cotton and the position of the leaf. At the bottom of photograph is the seal of the Department of Agriculture and the certificate and signature of the Secretary. Standards for the other grades and for color are represented in the same manner.

In the manufacture of yarns and fabrics, for which all but a negligible portion of the crop is ultimately destined, cotton of certain definite qualities is ordinarily selected for certain kinds and qualities of goods. Spinners require cotton that has been selected

or classed into uniform or nearly uniform lots, both in grade and staple. As numerous grades and staples are found in the average receipts of every country market, classification is obviously essential in the merchandising operations which attend the movement of cotton from the farm to the mill.

In the field of financing it also plays a part. Cotton factors and commission merchants have long been accustomed to appraise cotton for loans and advances according to its classification. Commercial bankers, on the contrary, have not until recently given close attention to this phase of their loan collateral, although to ascertain very nearly the market value of a bale of cotton of which the weight and classification are known is, in most cases, a simple matter. Banks have found difficulty in securing classification data from a disinterested source, and with the purpose in part of meeting this condition, the United States warehouse act was passed in 1916. According to its provisions a warehouse, properly examined, bonded, and licensed, may issue a receipt bearing on its face a notation of the grade and staple of each bale represented and for this classification the warehousemen stand responsible to the holder of the receipt. Needless to say bankers generally have to recognize the advantage of such a receipt, and their interest in cotton classification has been correspondingly stimulated.

The spinning value of cotton can be expressed, to a certain extent, in terms of grade and staple length. The longer staples and better grades are, as a rule, used in the production of the finer and stronger yarns and the finer fabrics. The higher grades contain less waste and usually give more satisfactory results in the bleaching and dyeing processes. Generally speaking, the longer staples go into yarns of greater strength and of higher count or of finer size. There is, however, in addition to grade and staple, another important element in spinning value known as character. By character is meant the strength, "body," uniformity, and smoothness of the fibers. The term is sometimes loosely employed in the cotton trade to denote color or kind of cotton, but in this circular it will be used only in its more exact sense.

For convenience of arrangement, the subjects of grade, staple, and character are separately considered. Since the upland varieties constitute all but a small fraction of the American crop, the discussion relates particularly to upland cotton, as distinguished from American Egyptian and sea-island cottons. The principles, nevertheless, that govern in the classification of upland cotton apply equally to cotton of any growth, and in treating the classification of the American Egyptian and sea-island varieties it is only necessary to point out in one or two paragraphs certain of their special characteristics which are different from those of the upland varieties.

CLASSIFICATION ACCORDING TO GRADE.

The grade of cotton is governed to a large extent by weather conditions in the period intervening between the opening of the bolls and the time of picking. Low grades are produced, however, even under favorable weather conditions, by deferred or careless picking, improper ginning, or exposure of the seed cotton to excessive moisture before ginning. Under average conditions of handling, cotton

picked early in the fall before frost and while the leaves of the plant are green should be white or light creamy white, bright in color, and comparatively free of leaf. Cotton which opens before frost but which is picked after frost may be white but leafy, since the foliage of the cotton plant is killed by freezing temperatures and becomes brittle so quickly that broken particles adhere to the locks when they are gathered.

Bolls which are opened by frost usually yield a lint with a yellow tinge or stain, though if left unpicked in the field in clear weather discoloration of this kind may be somewhat bleached out by strong sunlight. On the other hand, bolls that are left open in the field for a long time tend to lose their luster and to become dull or gray or even bluish from fungus growth induced by continued exposure to rain and dust. In some sections cotton grown on red land takes on a reddish land stain from the action of dust and rain. In a normal season several pickings are generally made successively in the same fields, and as the weather conditions between these pickings may vary it usually happens that a considerable number of grades can be found in the crop of a single field.

GRADE STANDARDS

Practically all of the grades within a range to be found in a normal crop have been standardized by the Department of Agriculture.

In the establishment of the standards for upland cotton the purpose has been to represent in a single set of standards the somewhat diverse characteristics of cotton grown in each of the principal sections of the Cotton Belt. In carrying out this purpose the selection of cotton for the preparation of the original standards and of the practical forms has been made from every important cotton-growing State of the South.

The first effort at standardization was made in 1909, when a set of types for nine white grades was prepared. These were known as the permissive standards. Although they were adopted by the New Orleans and the New York cotton exchanges their use never became common, and because of certain objections they were replaced in 1914 by the Official Cotton Standards, established and promulgated under authority of the United States cotton futures act.

On December 15, 1914, an order of the Secretary of Agriculture effected the establishment and promulgation of standards for the following nine grades for upland white cotton, the uses of which was compulsory in future trading:

Middling Fair.	Strict Middling.	Low Middling.
Strict Good Middling.	Middling.	Strict Good Ordinary.
Good Middling.	Strict Low Middling.	Good Ordinary.

By a similar order, standards were established on January 28, 1916, for color for upland cotton in the following grades:

Yellow Tinged.	Low Middling.	Blue Stained.
Good Middling.	Yellow Stained.	Good Middling.
Strict Middling.	Good Middling.	Strict Middling.
Middling.	Strict Middling.	Middling.
Strict Low Middling.	Middling.	

Practical forms of the standards for each of these grades were prepared for distribution as provided in the act. Each practical form consists of a box made of heavy cloth-covered pasteboard in which are placed samples of 12 bales, all of the same grade. To this box is attached a hinged cover, on the underside of which is mounted a photograph of the samples showing the size and position



FIG. 3.—Empty standard box, showing the unfilled cartons and their arrangement numerically.

of the foreign matter originally present on the surface of the cotton and the quality of preparation. The photograph bears an imprint of the seal of the Department of Agriculture and a certificate of the Secretary of Agriculture dated and signed by himself or by another official designated for the purpose. The 12 samples which each box contains not only show the range or variation of quality allowed within that grade, but represent regional differences as well. For convenience of reference each sample is given a numbered position in the box. (See fig. 3.)

On August 12, 1916, the day following the reenactment of the United States cotton futures act, the same official standards were re-established in identical form.

On July 26, 1922, public notice was given by the Secretary of Agriculture of an order effective August 1, 1923, revising the existing standards. To permit the more exact classification

of cotton by color, additional designations were established for color which is intermediate between adjacent practical forms, including yellow tinged cotton of the grade of Strict Good Middling. These additional designations are defined by the practical forms for the lighter and deeper colors on either side and they embrace all cotton the color of which is too deep to be found in the lighter box or too light for the deeper box.

In keeping with the policy of the department to use numbers in designating grades of all commodities for which it has established

standards of quality, the numerical system was introduced in the revised standards, No. 1 being assigned to Middling Fair and successive higher numbers to the lower grades in their order. The scheme of standardization thus effected is shown graphically in Table 1.

TABLE 1.—*Grades and colors of the universal standards for American upland cotton.*

Blue stained.	Gray.	Standards for Grades of Upland Cotton, White.	Spotted.	Yellow tinged.	Light stained.	Yellow stained.
		1 or M. F.				
		2 or S. G. M.		2 T.		
3 B.	3 G.	3 or G. M.	3 Sp.	3 T.	3 L. S.	3 S.
4 B.	4 G.	4 or S. M.	4 Sp.	4 T.	4 L. S.	4 S.
5 B.	5 G.	5 or M.	5 Sp.	5 T.	5 L. S.	5 S.
		6 or S. L. M.	6 Sp.	6 T.		
		7 or L. M.	7 Sp.	7 T.		
		8 or S. G. O.				
		9 or G. O.				

Symbols in heavy type denote grades and colors for which practical forms of the official cotton standards are prepared. Symbols in italics represent the designations of cotton which in color is between practical forms.

The grades shown above the black lines are deliverable on future contracts made in accordance with section 5 of the United States cotton futures act. Those below the line are untenderable on such contracts.

The United States cotton standards act of March 4, 1923, gave legal force to the official cotton standards established under the United States cotton futures act in all spot cotton transactions in interstate and foreign commerce, requiring their use after August 1, 1923, in every such case in which cotton was described by any standard or system of classification.

The passing of legislation making mandatory the use of the official standards in interstate commerce brought about a resumption of negotiations between the Liverpool Cotton Association and the Department of Agriculture, which culminated in an international conference at Washington on June 11-12, 1923. This meeting was attended by representatives of the Liverpool Cotton Association, the Manchester Cotton Association, the Syndicat du Commerce des Cotons du Havre, and the English Federation of Master Cotton Spinners' Associations. The delegation from Liverpool held proxies from the associations at Bremen, Rotterdam, Ghent, Barcelona, and Milan. After a thorough discussion the visiting representatives submitted recommendations which led subsequently to the formal adoption of the official standards for grade and color for upland cotton by each of the associations named.

As these are the most important mercantile organizations in the cotton trade of Europe, their action in effect gave world-wide application to the standards which they adopted. In deference to the

wishes of the European delegations, the department agreed that the grade and color standards for upland cotton should be known as "universal standards."

In adopting the standards, however, the Liverpool association stipulated that certain modifications in the white standards for Good Middling, Strict Middling, Middling, and Strict Low Middling were desired. A second conference was therefore called at Washington on July 18, 19, and 20, to which came delegates from the Liverpool and Manchester associations, the Liverpool association acting as before for the principal continental exchanges. American trade interests were represented by approximately 30 leading merchants, exporters, spinners, and farmers.

The conference recommended the change of 1 bale in the Good Middling box, 1 in the Strict Middling, and 2 in the Middling. In Strict Low Middling a very minor change was suggested. Acting upon the advice of the conference, the Secretary of Agriculture, on July 30, 1923, under authority of the United States cotton standards act, published an order putting into effect the proposed changes on August 1, 1924. In the same order all of the other standards for grade and for color, which had been promulgated on July 26, 1923, under the United States cotton futures act, were repromulgated, without change, under the United States cotton standards act, and use was sanctioned of the alternative name "universal standards."

THE ELEMENTS OF GRADE QUALITY.

Color.—The first factor to be considered in determining the grade of cotton is color. The major divisions of color—white, spotted, tinged, light stained, yellow stained, gray, and blue stained—are represented by separate designations, as shown in Table 1. Minor variations occur within each of these general divisions. The term "white," especially, has in its usage here a relative meaning and, in fact, includes a range of light color. In the grades Middling Fair and Strict Good Middling white cotton is slightly creamy, bright, "bloomy," and free of any discoloration. In the grades below Strict Good Middling the brightness is less pronounced. In Middling there are some "dead white" or "pearl white" bales and in the grades below Middling the color becomes dull and even approaches gray. The grades Strict Middling, Middling, and Strict Low Middling admit some boll-weevil spots, while Low Middling contains still heavier spotted discoloration. There being no separate designations for color in the grades below Low Middling, the allowable discoloration, both yellow and gray, in Strict Good Ordinary and Good Ordinary is considerable.

A range of color is found also in each standardized color. In the high grades the bales are brighter and the color lighter, while in the lower grades the colors are deeper and duller. Each box shows the permissible range of color in the grade it represents.

In the new standards the boxes for the nine white grades not only define the color of white cotton, but govern as well in determinations of leaf and of preparation of all cotton regardless of its color. The

standards for color are representative of color only. The grade of colored cotton, therefore, is determined by reference to both the white standards and to the color standards of the same grades.

Color standards were designed to permit a classification of cotton according to color as nearly exact as possible. A bale, for example, which because of yellow color can not be classed as white and which is lighter than the lightest bale in the tinged box of the same grade is "spotted." The same principle applies to bales which in color are between tinged and yellow stained and between white and blue. As the descriptive standards embrace all of the middle ground between two adjacent color standards of the same grade for which practical forms have been prepared, there are few bales in the grades Middling, Strict Middling, and Good Middling, the color of which does not fall within the range represented by the standards.

Except for Strict Good Middling yellow tinged, no color is recognized in grades above Good Middling. The tinged color in Strict Good Middling tinged is necessarily so light that it corresponds closely to that in the Good Middling spotted designation and it is therefore neither necessary nor feasible to attempt a finer color distinction between tinged and white cotton of that grade.

Below Middling, spotted and tinged cotton are recognized in the grades of Strict Low Middling and Low Middling. Inasmuch as very deep color is found in the tinged standards for both of these grades, there is little cotton of yellow color that can not be described by the boxes. Cotton in these grades of such color that it can not be classified according to the standards can only be classed by comparison with boxes of lower grades of white cotton with which it has equal spinning value, or as "below grade." The experience of the classer must be his guide in cases of this kind.

From a practical standpoint no great amount of consideration need be given to low-grade cottons for which colors have not been sharply defined. The total production of yellow-stained cotton is small and comes usually from the freezing of the "top crop" of the plant. Until means are found of effectively controlling the boll weevil the world may expect in the future little top-crop cotton, and consequently little cotton of this color description. Stained cottons and the lower grades of tinged cottons are, as a rule, sold on actual samples or private types without attempting any exact designation. As the amount of such business is relatively very small, no need has been felt for standards of either yellow or blue stained cotton below Middling in grade.

Foreign matter.—The second principal element of grade is the foreign matter present in the lint, such as leaf, shale, motes, sand, and dust.

Given normal color and preparation in each successive grade, the relative amount of foreign matter may be said to increase by progressively lengthening steps from Middling Fair, which is almost free of extraneous substances, to Good Ordinary, in which the proportion, especially of leaf, is comparatively large. This principle in the scheme of classification rests on the fact that all foreign matter is eliminated as waste in the processes of spinning. As the proportion of waste varies inversely with that of spinnable lint,

the grades of highest spinning value, other conditions being equal, are those in which there is the least foreign matter. However, variations which are readily distinguishable in the high grade, in which the leaf content is relatively small, are wholly imperceptible in lower grades, in which the proportion of leaf is larger; hence the necessity for widening steps in descending the grade scale.

Leaf is a term broadly used to mean dried and broken plant foliage of various kinds. Broken pieces of leaves, stems, and hulls are included, as well as fragments of the bracts and calyx, remains of the square which in a dried condition cling to the burr and are gathered with the locks. Large leaf as a rule is less objectionable than "pin leaf," fine particles, which are more difficult to remove in the spinning processes and more likely to appear in the yarn and thus to depreciate its value.

Traces of *sand* and *dust* are found frequently in the low grades and occasionally in Middling and Strict Middling. If the amount of either is excessive, the cotton is styled "sandy" or "dusty" and penalized by additional heavy discounts in the price. Winds which beat sand or dust into open, unpicked bolls may sometimes account for the presence of sand and dust in the bale, but more often the cause can be traced to the gathering of locks that have fallen to the ground or to the practice of piling seed cotton directly on the ground in the field without first laying down a tarpaulin or other protection. Sand may be detected by shaking the sample gently over a clean paper and catching the grains as they drop. Dust does not fall readily. Its presence is indicated by a dull, unnatural color in the cotton and can be proved by manipulating the sample somewhat as a bellows. As the air is forced out of the lint it carries the dust with it in a visible jet.

Shale is the silver lining of the carpel or burr which separates the locks in the unopened boll. It is found principally in the low grades, particularly in snaps and bollies. Shale fragments are also sometimes called shives.

Motes are immature and unfertilized seeds or the ends of seeds that are pulled off in ginning. (See fig. 4.) They occur more frequently in some varieties than in others and are more numerous in cotton which matures in excessively dry weather. The presence of motes in a bale reduces its grade, since they must be eliminated as waste in the manufacturing processes.

Much of the leaf, shale, sand, and dust in seed cotton can be removed by the use of "huller" gins. (See fig. 5.) Cleaners properly used in connection with any type of gin also improve the quality of the bale from one to two grades.³ The cleaning machinery, however,

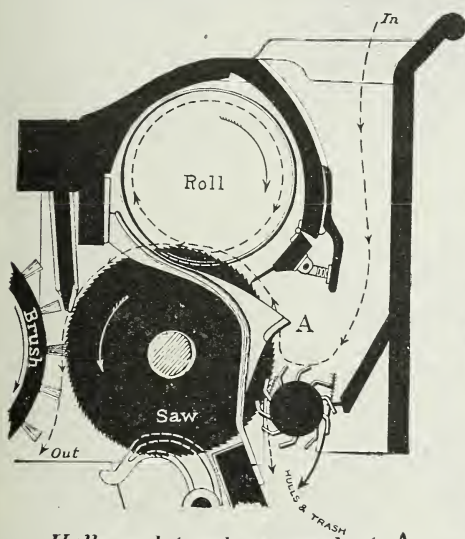


FIG. 4.—Motes.

³ See Taylor, Fred.; Griffith, D. C.; and Atkinson, C. E., U. S. Department of Agriculture, Farmers' Bulletin 764, 1916, Cotton Ginning Information for Farmers.

operates most effectively if the cotton is thoroughly dry when ginned. Motes are hard to separate. Their small size allows them to pass between the ribs of the gin, and the fibers which are attached to them become entwined and hold them in the mass of lint. Modern gins, however, are usually equipped with devices which arrest motes with more or less success.

Preparation or ginning.—The preparation of a bale of cotton is judged by the degree of smoothness with which the lint is ginned. (See fig. 6.) Smoothness is a quality much desired in all grades, but in the high grades it is essential. Poor ginning is evidenced by the presence in the sample of neps, gin-cut staple, stringy cotton, or by a general appearance of roughness.



Hulls and trash removed at A

FIG. 5.—Sectional view of huller gin.

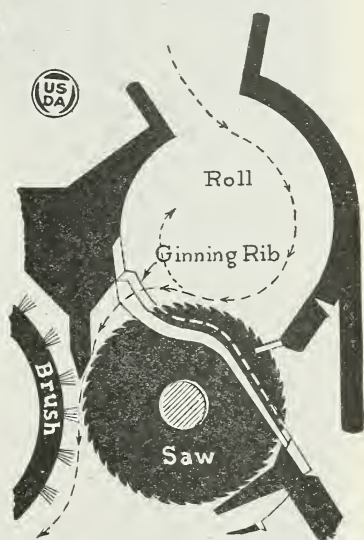


FIG. 5.—Sectional view of plain gin.

Neps appear as small white dots and may be seen best when a thin layer of fibers is held toward the light. (See fig. 7.) Cut fibers show in bunches and V-shaped kinks and give the sample a rough appearance. In the finished yarn they appear as lumps or thickened diameter and are especially objectionable in long-staple cotton intended for thread manufacture. Neps and gin-cut fibers are caused by defective saws, by too rapid feeding of the cotton to the gin, by running the gin too fast, by faulty adjustment of the gin, and very frequently by the presence of dampness in the cotton at the time of ginning.

The factor of *gin-cut fibers* (see fig. 8) in reality is one that should be considered in the determination of staple, but by long custom it has been admitted in questions of grade, since the waste percentage of such cotton is high. Because of the excessive waste, the value of gin-cut cotton is hard to determine, and the trade penalizes it by heavy discounts in grade and price.

Stringy cotton, as the name implies, is cotton that contains rolls or strings of fiber (fig. 9). The presence of strings or lumps reduces the value of the bale, because it is difficult to separate such fibers in the mill and the percentage of visible waste in spinning is



FIG. 6.—Smoothly ginned cotton.

much increased. This condition is usually caused by the ginning of damp cotton or improper functioning of the gin mechanism which removes the lint from the saws. In the case of long staple cotton, however, some allowance has to be made by the classer for the preparation, which is seldom as smooth as in cotton of shorter

lengths. The greater length of the fibers gives them a slight tendency to form curls in the ginning process even under the best conditions.

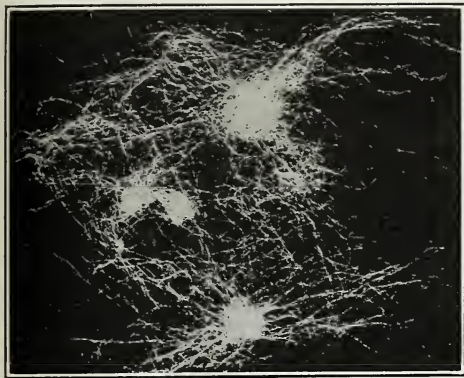


FIG. 7.—Neps.

poor, he then reduces the grade accordingly.

In examining a sample the classer "breaks" or opens it along the layers and views the different surfaces thus exposed. If the part of the sample drawn from one side of the bale is of a lower grade than that from the other side he gives the bale the lower grade. Leaf and other foreign particles, however,



FIG. 9.—Stringy cotton.

THE DETERMINATION OF GRADE.

To determine the grade of a bale of cotton the classer must appraise the sample with an eye to its color, foreign matter, and preparation, and in no two samples will he find these qualities in precisely the same proportion. Color and leaf are usually taken into account at the first glance, and the first opinion of grade is formed on the basis of normal preparation. If the preparation is

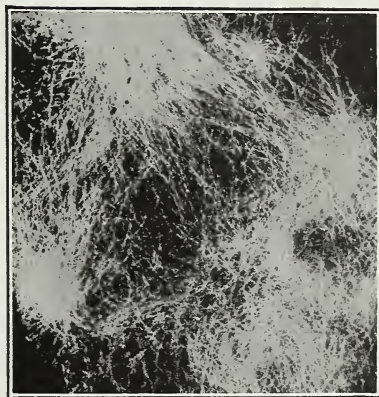


FIG. 8.—Gin-cut staple.

are not always evenly distributed in either side of the sample and the classer must generalize in his mind the grade of the various surfaces which he exposes on successive breaks, taking care not to penalize the bale too heavily on one low break or to give it too high a grade on an exceptionally good break. Occasionally, however, there will be found in a single portion of a sample an excessive

accumulation of leaf or fine dust, known technically as *gin-fall*. Gin-fall occurs only infrequently, and as the grade of the bale as a whole is not appreciably reduced by the presence of a small and

casual deposit of leaf concentrated in this way, it may be entirely disregarded.

Very few of the bales presented to the classer will match exactly the type samples of the standards. For the most part the classer must rely upon his own experience and knowledge of trade practice; he must average in his mind all the factors of color, leaf, and preparation and assign to each bale a grade designation the standard of which most nearly corresponds in intrinsic value to the bale. Herein lies the art of cotton classing, for which no hard and fast rules can be laid down. As a general principle, however, brightness in color compensates within certain limits for an excess of leaf or other foreign matter, and vice versa. Good color and cleanliness may be set off against rough ginning, or smooth preparation against dull color or leafiness.

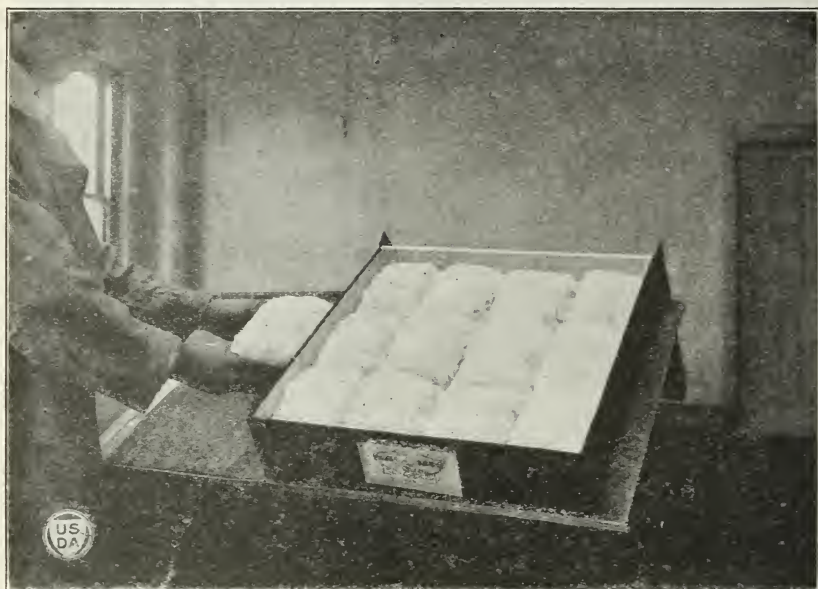


FIG. 10.—The proper method of comparing samples with the standards for grade.

Frequent reference to the standards is nevertheless helpful to the classer in fixing his ideas of grade and in keeping them uniform. He will also find them of special advantage in beginning his day's work and in examining cotton under varying conditions of weather and light. In comparing cotton with the standards, the sample should be rolled to present a surface as nearly like the type samples as possible and held beside the box in a position which will give the same light to both. (See fig. 10.) The type samples are never to be touched or taken from the box.

One difficulty encountered in classing upland cotton on the standards is that of designating bales of the so-called "split grades." In contrast with the trade ideas of former times, there are no half grades in the official standards. Each box represents a step of one

full grade, Strict Middling, for example, being a full grade above Middling. As no intermediate distinctions are recognized, there are some bales which in grade fall between the boxes being, to use the same example, better than Middling, yet too low for Strict Middling. The rule that guides classers of the Bureau of Agricultural Economics in such instances is that the bale takes the lower grade, except in cases where some other quality, such as desirability of character, which is not otherwise taken into account, give the bale a spinning value equal to that of the grade above. Character, there-

fore, though not in the strict sense an element of grade, may be admitted as the determining factor in the classification of split grades of upland cotton.



FIG. 11.—Crushed seed.

GRADES OF SEA ISLAND AND AMERICAN EGYPTIAN COTTON.

Sea island and American Egyptian cottons bear so little resemblance to the upland varieties that they can not be classed according to the upland standards.

Sea-island cotton.—Sea-island cotton for more than a hundred years has been bought and sold on a system of grading entirely its own. Its extra staple length requires that it be ginned on roller gins which give it a fleecy or tufted appearance, rough in comparison with the product of a saw gin. Crushed seeds, though seldom found in samples of upland cotton, are of more or less frequent occurrence in cotton ginned on a roller gin (fig. 11).

Official standards for grade for sea-island cotton based on the former commercial classification were established and promulgated by order of the Secretary of Agriculture on October 25, 1918, and were designated numerically in the order of the highest to the lowest grade as No. 1, No. 2, No. 3, No. 4, No. 5, and No. 6. Practical forms of the standards were prepared in the same manner as for the upland varieties.

Sea-island cotton resembles upland cotton somewhat in color, but on the whole is a trifle more creamy. The standards as established and promulgated are intended to include color, leaf, and preparation of the entire crop in a single set, and no separate color classification is attempted. The order of the Secretary of Agriculture, however, permits the designation of grades intermediate between those for which practical forms are established. Thus cotton between Grade No. 1 and Grade No. 2 would be classed as Grade No. $1\frac{1}{2}$, that between No. 2 and No. 3 as No. $2\frac{1}{2}$, and so on.

American Egyptian cotton.—Similar considerations in American Egyptian or Pima cotton require that it be classed according to separate standards. Like sea-island cotton, it can be ginned properly

only on gins of the roller type, and in preparation and foreign matter its appearance is similar to that of sea island. The tendency, however, of the lint of this variety to cling more tenaciously to the seed results in a somewhat greater amount of crushed seed than is usually found in sea-island lint. Crinkled or crimped staple also occurs more commonly.

Official standards for American Egyptian cotton were established and promulgated in a public notice of the Secretary of Agriculture on October 25, 1918, in the following grades: No. 1, No. 2, No. 3, No. 4, and No. 5. The same order provided for the designation of intermediate half grades, as in the case of the sea-island standards.

There is no separate color classification for American Egyptian cotton. The normal color of the Pima variety is not white, the highest grades being a light creamy yellow and the lower grades somewhat more deeply colored. In all grades, particularly in the lower ones, red spots are found, caused by anthracnose, a fungus disease which, especially in 1919, was prevalent in Arizona, the source of supply of this cotton.

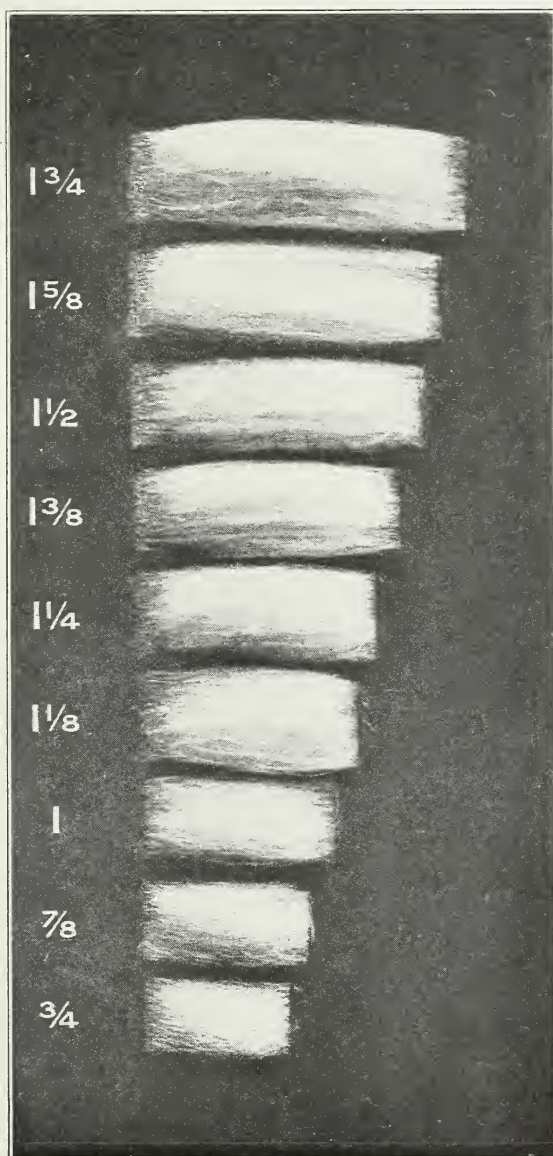
The tendency of the color, however, has been to change slightly season by season, approaching white, and in the crops of recent years the anthracnose spot has been much less pronounced. This change of color has necessitated a modification of the standards for this cotton, and a revision was ordered by the Secretary on July 26, 1922, effective August 1, 1923. The new standards will represent the same grades, and cognizance will be taken only of the general change in color of the crop. In the new standards, however, four samples from the old standards will be left in each box to provide against a possible future reversion of color to that of former years.

CLASSIFICATION ACCORDING TO STAPLE LENGTH.

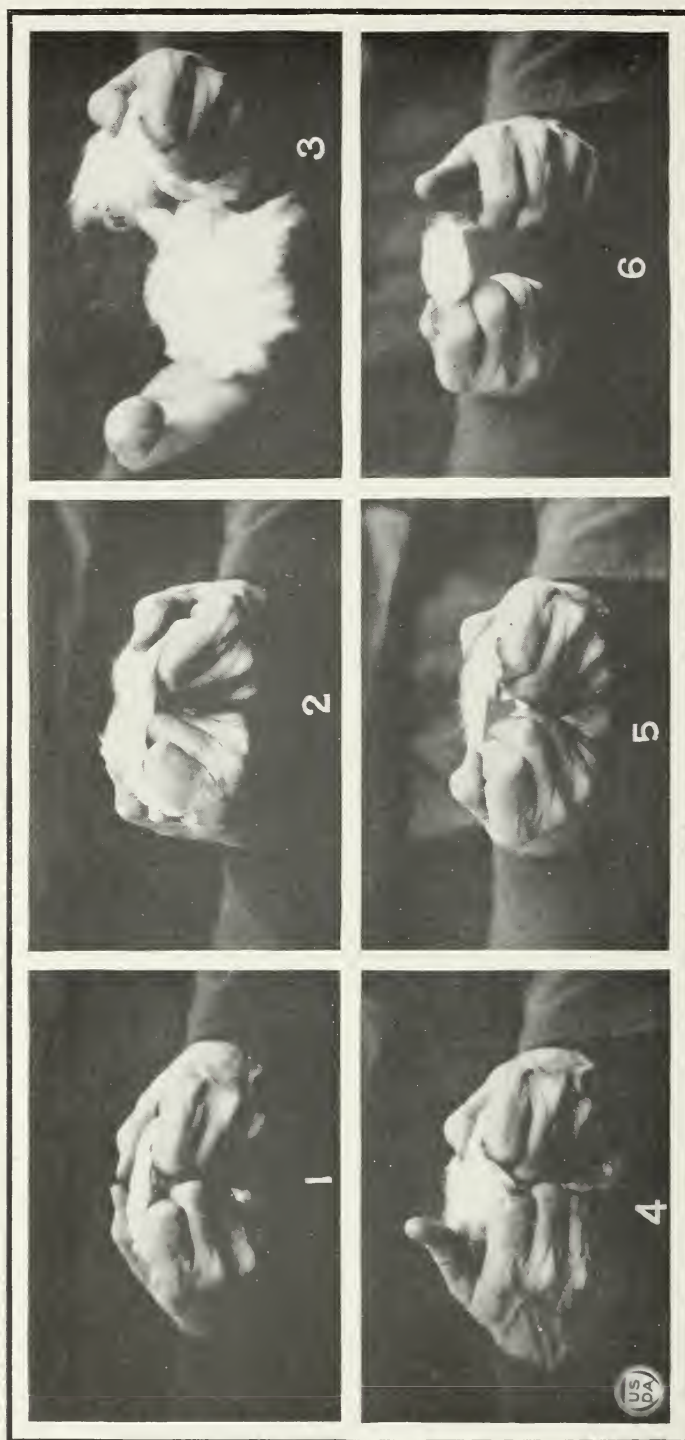
As a general proposition it may be stated that the staple length of cotton is more important in a determination of its value than is its grade. Paradoxically, large quantities of cotton are bought and sold in the country markets as "average receipts" without any reference to staple. Before such cotton reaches a mill, however, it passes through channels where it is carefully stapled, selected, and assembled in even-running lots.

LONG AND SHORT STAPLE COTTON.

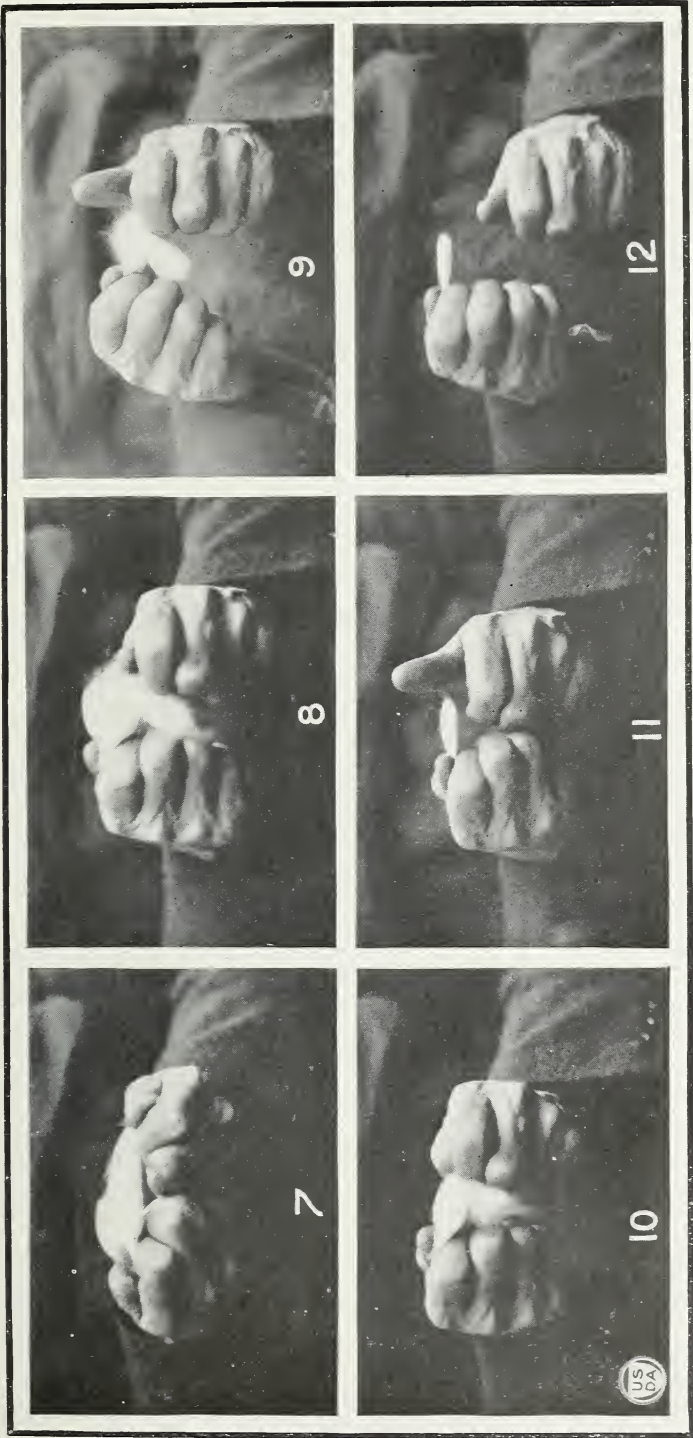
Cotton is roughly divided according to its length into long staples and short staples. By custom, the dividing line is $1\frac{1}{8}$ inches, cotton of that length and longer being known as long-staple cotton, extra staple cotton, staple cotton, extra staples, or staples. Shorter lengths are referred to as short-staple cotton or short cotton. This line of demarcation is recognized by many trade organizations in cases where separate sets of rules are made for trading in long-staple and short-staple cottons. The tendency in recent years, however, has been to acknowledge premium value in any cotton 1 inch or more in length, and the term short staple has come to be applied by common usage more particularly to cottons which are less than 1 inch in length of staple.



A photographic representation of the Official Cotton Standards of the United States for some of the lengths of staple for which practical forms are available for distribution. (Stapling by R. L. Francis, Specialist in Cotton Classing.)



Method of pulling staple, i. e., separating a typical portion of the fibers of the cotton, in order to determine its length of staple.



Method of pulling staple—Continued.



Method of pulling staple—Continued.

STANDARDS FOR LENGTH OF STAPLE.

Official standards of the United States were established and promulgated under authority of the United States cotton futures act on October 25, 1918, for the following lengths of staple, expressed in inches or in fractions of an inch: Below $\frac{3}{4}$, $\frac{3}{4}$, $\frac{13}{16}$, $\frac{7}{8}$, $\frac{15}{16}$, 1, $1\frac{1}{32}$, $1\frac{1}{16}$, $1\frac{3}{32}$, $1\frac{1}{8}$, $1\frac{5}{16}$, $1\frac{7}{16}$, $1\frac{9}{16}$, $1\frac{11}{16}$, $1\frac{13}{16}$, $1\frac{15}{16}$, $1\frac{1}{2}$, $1\frac{17}{32}$, $1\frac{19}{32}$, $1\frac{21}{32}$, $1\frac{23}{32}$, $1\frac{25}{32}$, $1\frac{27}{32}$, $1\frac{29}{32}$, $1\frac{31}{32}$, and upward in like manner in gradations of thirty-seconds, disregarding any fraction less than a thirty-second. A thirty-second of an inch is the smallest gradation usually recognized in commercial classification and represents the limit of exactitude which it is possible to attain by the best methods of stapling in use at the present time. In practice, however, the word "thirty-second" is seldom employed, length descriptions involving this

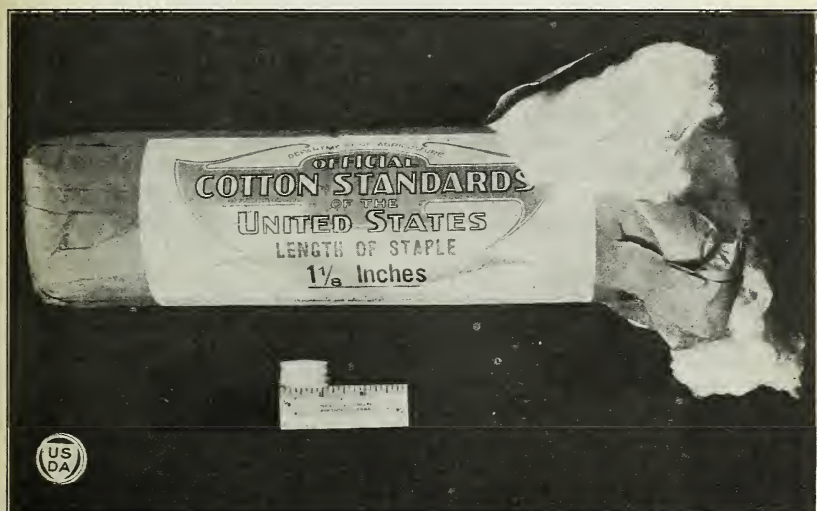


FIG. 12.—A practical form of the official cotton standard for length of staple $1\frac{1}{8}$ inches and a typical "pull" of fibers from the cotton.

minute unit being customarily expressed by the trade in terms of sixteenths of an inch, as, for example, 1 to $1\frac{1}{16}$, $1\frac{1}{16}$ to $1\frac{1}{8}$, etc.

Practical forms of the standards have been prepared in the following lengths (see fig. 12) :

Upland.	Sea Island.	American-Egyptian.
$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$
$\frac{7}{8}$	$1\frac{5}{8}$	$1\frac{5}{8}$
1	$1\frac{3}{4}$	$1\frac{3}{4}$
$1\frac{1}{16}$		
$1\frac{1}{8}$		

The standards for length of staple established under the United States cotton futures act are also specified as the official standards in the cotton standards act. Their use is made mandatory in interstate and foreign commerce in all cases when a standard is employed to describe length alone as distinguished from length combined with character.

As the apparent length of cotton fibers varies with the amount of their moisture content, the order of the Secretary of Agriculture establishing the standards specifies that the practical forms are to be considered representative of the standards only at a relatively atmospheric humidity of 65 per cent and a temperature of 70° F.

The standards represent the actual measurement of typical fibers without regard to any quality other than length. (See Pl. I.)

STAPLE DETERMINATION.

The length of cotton fibers is determined by pulling the staple. As every sample contains fibers of more or less varying length, the drawing out of representative fibers is a process involving much skill. Little agreement exists among classers as to their ideas of staple length, and this lack of unanimity can be explained in a measure by the differences in their methods of pulling staple. In commercial work, few classers take time to pull out the fibers and measure them; but form their judgments of length rapidly from the "break" and "drag" of the cotton in their hands. In the arbitration of disputes, however, the actual measurement of fibers is the only decisive way of determining length. A method of pulling staple has therefore been adopted by specialists of the Bureau of Agricultural Economics which is recommended in all cases where measurements are desired. The successive steps involved in this method have been photographed and are reproduced in Plates II, III, and IV.

Detailed description of method of pulling staple.—Grasp in the two hands a tuft of cotton of a size convenient for the purpose (about one-fourth of an ounce), holding it firmly between the thumb and forefinger of each hand, with the thumbs placed together, the fingers being turned in toward the palms of the hands, and the middle joints of the second, third, and fourth fingers of each hand touching the corresponding joints of the fingers of the other hand, so as to give a good leverage for breaking the cotton. (See Pl. II, fig. 1.)

Pull the cotton slowly with about the same leverage of each hand on the joints of the fingers, separating the tuft of cotton into two parts. (See Pl. II, fig. 2.)

Discard the part remaining in the right hand. (See Pl. II, fig. 3.)

Grasp with the thumb and forefinger of the right hand the end of the tuft of the cotton retained in the left. The point of pressure on the cotton in the left hand is just below the joint of the thumb and at the nail joint of the forefinger. (See Pl. II, fig. 4.)

With the right hand draw a layer of fibers from the cotton held in the left hand. (See Pl. II, fig. 5.)

Retain in the right hand the layer so drawn. (See Pl. II, fig. 6.)

Repeat this operation four or five times, placing each successive layer directly over the fibers previously drawn, using care to see that the ends of all the layers are even with each other between the thumb and forefinger of the right hand. (See Pl. III, figs. 7, 8, 9, 10.)

After discarding the cotton in the left hand hold the fibers thus obtained between the thumb and forefinger of the right hand and smooth them with the thumb and forefinger of the left hand. (See Pl. III, figs. 11, 12.)

Place these fibers on a flat, horizontal surface with a black background, preferably black velvet. (See Pl. IV, figs. 13, 14.)

Block off the ends of the fibers with a cotton stapling rule, so as to indicate the length of the bulk of the fibers. (See Pl. IV, figs. 15, 16.)

Then measure the distance between the blocked-off ends. (See Pl. IV, fig. 17.)

CLASSIFICATION ACCORDING TO CHARACTER.

Of almost equal importance with grade and staple is the attribute of character, though of the three it is probably the least understood. Character has to do with the strength, body, uniformity, and smoothness of the fibers. There are as yet no standards with which to compare it. The classer must judge it by the "break" and "drag" and the feeling of the fibers in his hands, guided only by his training and experience. Investigations to discover the relation of strength in fibers to strength in yarns have been undertaken by the Bureau of Agricultural Economics, and in these investigations it is hoped to find in the near future a basis for the establishment of character standards.

Strength is much desired in cotton fibers. With certain qualifications, it may be said that the stronger fibers make stronger yarns, although tests in the laboratory of the Bureau of Agricultural Economics indicate that there is no well-defined relation between the two, weaker fibers in some instances producing yarns of greater tensile strength in the same count. Strength is ordinarily judged by pulling out the fibers as if to measure the staple, grasping each end of the tuft and pulling until it breaks in the middle. Among all the various qualities which are regarded as constituting character in cotton, strength appears the most probable to lend itself to mechanical determination and standardization.

Body is the relative density of the fibers, and is judged by the weight and firmness of the sample as well as by the "drag." The fibers of heavy-bodied cotton cling closely together and give solidity to the sample. It is believed that the diameter and degree of spirality possessed by the fibers are elements in body, and experiments are now under way to determine the true facts. In hard-bodied cotton the fibers when pulled show good resistance or "drag" or a "hard break." The term implies not only strength and uniformity in the fibers but their tendency to cling together. The staple of hard-bodied cotton can be pulled out readily and blocked off squarely, in contrast with soft cotton which can be squared only by careful handling.

Uniformity refers to the regularity of length of the fibers in the sample. Cotton which is not uniform contains more variations in fiber length than usual, due either to the growing of mixed varieties or of varieties which tend to "butterfly"—i. e., the staple when combed out on the seed is longer at the base than on the point, thus resembling a butterfly in shape. (See fig. 13.) The percentage of waste in such cotton is necessarily high. Inexperienced classers may easily be deceived in cotton which is not uniform by attempting to judge its staple on the break only. Although the

first break may be hard, the staple is difficult to block off and the apparent length fades away as the longer fibers are withdrawn and discarded.

Smoothness or silkiness of the fibers is largely a varietal characteristic and is highly desirable in cottons used in the manufacture of fine goods. In general, silkiness goes with fineness of diameter in the fibers.

Character is difficult to define with exactness. Many commercial classers undertake to express it in terms of staple length. Good character is always implied in the absence of any specific description. In designating the length of staple of cotton for export shipment, whether in millimeters or otherwise, the body of the cotton is always considered. There is much warrant for this view, since the shorter staple of hard-bodied cotton will produce a yarn as strong or stronger than a soft cotton of somewhat longer staple length, and in the final analysis the value of any bale is its value for spinning purposes. Many commercial firms represent character

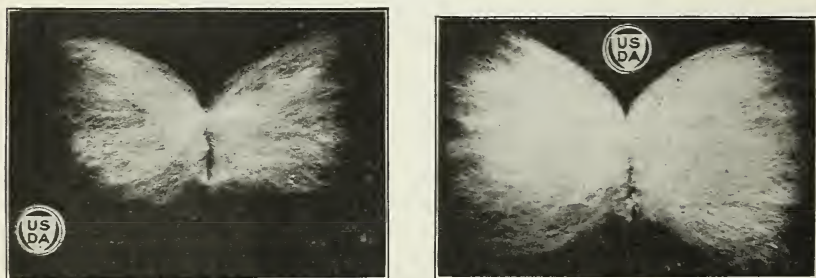


FIG. 13.—Uniformity in staple. These illustrations show two cotton seeds the lint of which has been combed out to demonstrate its length and uniformity. The specimen on the right is from a pure strain selected for its regularity. Observe the contrast in the specimen on the left, which has degenerated into a “butterfly” type. The longer lint at the top when ginned with the shorter fibers on the pedestal end of the seed will produce a lint of poor character, lacking entirely in uniformity.

to their correspondents or clients by means of types, while others indicate it by a mention of the point or general area of the cotton’s origin.

REGIONAL TRADE NAMES AND SHIPPING POINT REPUTATION.

Hard-bodied strong cottons and those of extra staple length come from the best varieties only and require for their production good growing weather and strong, rich soils (see fig. 14). Because of the use of superior varieties, the consistent application of fertilizers, or of exceptionally favorable conditions of soil and climate, certain localities acquire reputations for the character and staple of their cottons which serve to identify them in the trade. Such expressions as Mississippi Deltas, North Georgias, North Texas, Red River staples, Carolina staples, and Mississippi hill cotton are to an experienced cotton dealer all expressive of character of some kind or other, and in a general way of length of staple, though, strictly speaking, neither the character nor the staple length of any of these cottons is entirely uniform. In the western belt the discrimination is even finer, and much of the cotton is known in the ports and larger interior markets by the name of the shipping point of

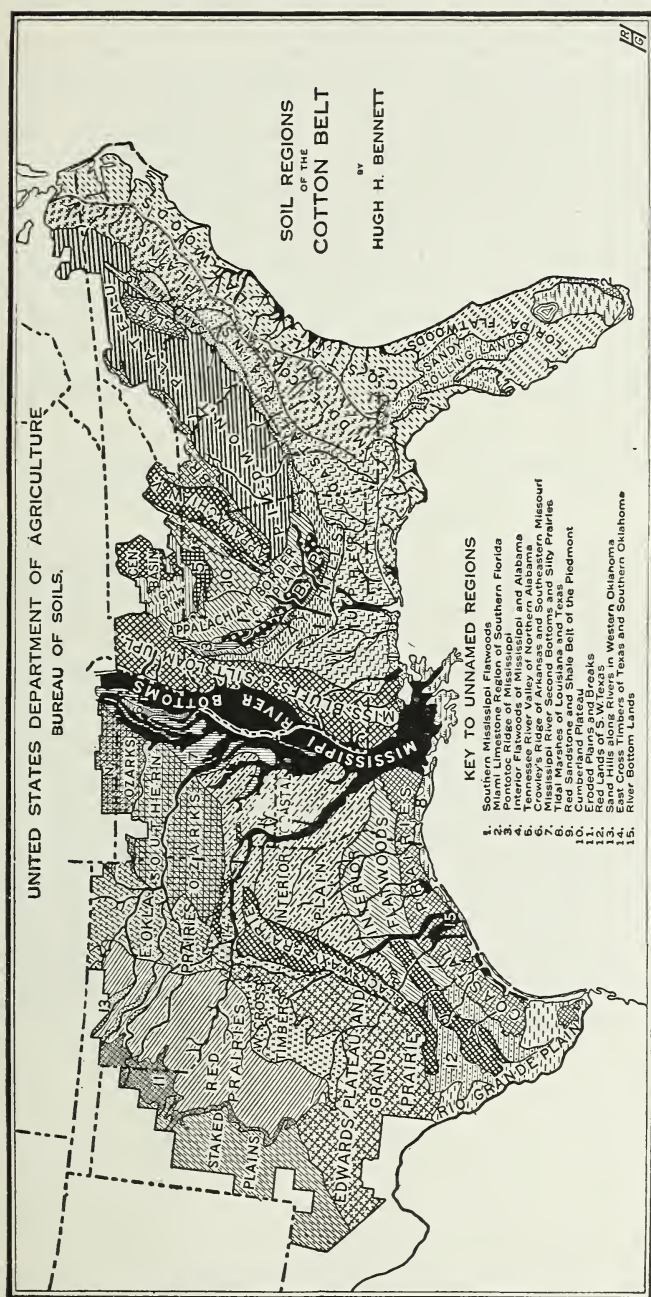


FIG. 14.—Varieties of soil in the Cotton Belt, one of the causes of regional differentiation in the character of cotton.

the immediate section in which it originates. Cotton of equal grade and staple from two such points separated from each other by a distance of only a few miles will sometimes sell consistently for prices a cent a pound or more apart.

Certain regional names have gained such common usage that they deserve special explanation. In early days in the New Orleans and Memphis markets, cotton was known as "Staples" or "Peelers," "Benders," "Rivers" and "Creeks." Staples or Peelers were the long-staple varieties from the Yazoo and Mississippi Delta plantations. Benders referred to cotton of extra length and character which the river boats took up from the plantations in the bends of the river where the soil was extraordinarily rich. Rivers were the hard-bodied cottons from the plantations along the Mississippi and its tributaries, the Creeks the slightly softer cottons from along the smaller streams where there was less bottom land. Uplands was originally the term used to describe short cotton from the hill sections, but gradually it has come to mean in this country all of the crop of the United States except the Sea Island and American Egyptian varieties.

THE RELATION OF CLASSIFICATION TO VALUE.

GRADE DIFFERENCES.

Contracts for the purchase and sale of cotton may be for specific amounts of certain grades and staples, but those negotiated on the future exchanges, as well as the majority of those in the country markets, are known as *basic contracts*. That is to say, a price is specified for a basis grade, which ordinarily is Middling, with the stipulation that if other grades are delivered they shall be settled for a certain agreed *differences*. By "differences" is meant premiums for the grades above Middling and discounts for the grades below Middling. The differences may be stated in fractions of a cent, but are more frequently expressed in "points" or hundredths of a cent per pound. The value of each of the higher grades is said to be a given number of points "on" Middling, while each lower grade is commonly spoken of as being worth a stated number of points "off" Middling. In all of the more important markets of the United States the prevailing differences are quoted daily. (See Table 2.) Although the classer must judge a bale solely on its merits without regard to quotations, nevertheless the classing of the bale is the first step in the process of valuation.

TABLE 2.—Grade differences reported by 10 important spot markets ¹ on July 31, 1922.

Market.	White standards.										Yellow tinged.				Yellow stained.				Blue stained.			
	Mid. Fair.	St. G. M.	Good Mid.	St. Mid.	S. L. Mid.	Low Mid.	St. G. O.	Off.	St. G. O.	Off.	St. Mid.	St. Mid.	Off.	Mid.	Good Mid.	St. Mid.	Off.	Mid.	Good Mid.	St. Mid.	Off.	Mid.
Norfolk.....	On.	On.	On.	On.	Off.	Off.	Off.	Off.	On.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.	Off.
Augusta.....	200	150	100	50	35	100	175	250	50	100	50	Even.	50	100	100	100	100	275	150	200	200	200
Savannah.....	125	100	75	38	37	100	175	275	50	100	37	40	50	100	100	100	175	200	100	200	200	200
Montgomery.....	163	125	88	50	50	100	150	200	50	150	50	40	50	150	100	200	200	300	150	225	225	300
New Orleans.....	175	150	100	50	50	125	200	275	50	175	75	40	50	200	125	200	275	300	150	225	225	300
Memphis.....	225	150	100	50	50	125	225	325	50	200	50	40	50	200	125	225	250	300	125	150	150	200
Little Rock.....	200	150	100	75	50	125	225	325	75	150	50	25	50	150	125	200	275	125	100	150	150	200
Dallas.....	200	150	100	75	50	150	250	350	50	175	75	Even.	50	175	150	250	350	125	175	225	225	325
Houston.....	150	125	100	50	75	150	250	320	50	175	50	40	50	175	150	250	350	150	175	225	225	325
Galveston.....	250	175	100	50	75	150	250	320	50	175	50	40	50	175	150	225	325	150	150	225	225	300
Average.....	181	138	94	54	56	125	213	303	53	155	54	On 3...	53	125	125	218	303	138	213	295	295	295

¹ The average differences of these 10 markets are used in settlements for cotton delivered on future contracts of the New York Cotton Exchange, the markets being designated for the purpose by the Secretary of Agriculture under authority of the United States cotton futures act.

Differences fluctuate with the supply and demand of the respective grades. Normally, if the bulk of any given crop is of low grade the differences will be wide, as the high grades will be at good premiums and the low grades at heavy discounts. If the crop is of high grade, the reverse is likely to be true. An exceptional situation presented itself in the year after the close of the World War, when, as a result of the combination of a low-grade crop, an unusual demand for high grades, and the inability of large users of low grades in foreign countries to purchase here, the differences widened to a degree hitherto unknown. This condition, however, corrected itself when, in the depression following the summer of 1920, the greater part of the demand for cotton turned from high grades to low grades. The situation is illustrated by Table 3, which shows the average of the differences prevailing on the dates stated in the following 10 spot markets of the United States: Augusta, Ga., Dallas, Tex., Galveston, Tex., Houston, Tex., Little Rock, Ark., Memphis, Tenn., Montgomery, Ala., New Orleans, La., Norfolk, Va., and Savannah, Ga.

TABLE 3.—*Comparative value of standardized cotton grades as shown by middling quotations and commercial differences on stated dates.*

[Average of 10 designated spot markets.]

Grade.		May 15, 1916.	July 17, 1920.	July 31, 1922.	July 31, 1923.
Middling Fair.....	Points on.....	97	403	181	92
Strict Good Middling.....	do.....	71	328	138	69
Good Middling.....	do.....	48	253	94	48
Strict Middling.....	do.....	26	135	54	26
Middling (basis).....		12.79¢	39.94¢	21.51¢	21.94¢
Strict Low Middling.....	Points off.....	31	308	56	27
Low Middling.....	do.....	76	848	125	69
Strict Good Ordinary.....	do.....	126	1,245	213	121
Good Ordinary.....	do.....	177	1,433	303	175
Good Middling Yellow Tinged.....	do.....	2	208	3 (on)	Even
Strict Middling Yellow Tinged.....	do.....	24	350	54	38
Middling Yellow Tinged.....	do.....	47	525	155	93
Strict Low Middling Yellow Tinged.....	do.....	84	768	228	138
Low Middling Yellow Tinged.....	do.....	126	1,110	310	190
Good Middling Yellow Stained.....	do.....	51	475	125	66
Strict Middling Yellow Stained.....	do.....	74	645	218	124
Middling Yellow Stained.....	do.....	100	835	303	171
Good Middling Blue Stained.....	do.....	57	595	138	95
Strict Middling Blue Stained.....	do.....	88	758	213	133
Middling Blue Stained.....	do.....	122	920	295	173

The average differences quoted on July 17, 1920, were the widest in many years. Middling was, however, at the same time at an exceptionally high point. In order to represent the fluctuations relatively, Table 4 is presented to show the differences expressed in percentages of the basis price.

TABLE 4.—*Commercial differences on standardized cotton grades expressed in percentages of basic price.*

[Average of 10 designated spot markets.]

Grade.		May 15, 1916.	July 17, 1920.	July 31, 1922.	July 31, 1923.
Middling Fair.....	Percentage on.....	7.6	10.1	8.4	4.2
Strict Good Middling.....	do.....	5.6	8.2	6.4	3.1
Good Middling.....	do.....	3.8	6.3	4.4	2.2
Strict Middling.....	do.....	2.0	3.3	2.5	1.2
Middling (basis).....		12.79¢	39.94¢	21.51¢	21.94¢
Strict Low Middling.....	Percentage off.....	2.4	7.7	2.6	1.2
Low Middling.....	do.....	5.9	21.2	5.8	3.7

TABLE 4.—Commercial differences on standardized cotton grades expressed in percentages of basic price—Continued.

[Average of 10 designated spot markets.]

Grade.		May 15, 1916.	July 17, 1920.	July 31, 1922.	July 31, 1923.
Strict Good Ordinary.....	Percentage off.....	9.8	31.2	9.9	5.5
Good Ordinary.....	do.....	13.8	38.4	14.1	8.0
Good Middling Yellow Tinged.....	do.....	.1	5.2	.1 (on)	1 (on)
Strict Middling Yellow Tinged.....	do.....	1.9	8.8	2.5	1.7
Middling Yellow Tinged.....	do.....	3.7	13.1	7.2	4.2
Strict Low Middling Yellow Tinged.....	do.....	6.6	19.2	10.6	6.3
Low Middling Yellow Tinged.....	do.....	9.8	27.8	14.4	8.7
Good Middling Yellow Stained.....	do.....	4.0	11.9	5.8	3.0
Strict Middling Yellow Stained.....	do.....	5.8	16.2	10.1	5.7
Middling Yellow Stained.....	do.....	7.8	20.9	14.1	7.8
Good Middling Blue Stained.....	do.....	4.5	14.9	6.4	4.3
Strict Middling Blue Stained.....	do.....	6.9	19.0	9.9	6.1
Middling Blue Stained.....	do.....	9.5	23.0	13.7	7.9

Differences vary also between markets, as will be seen in Table 2.

The differences represent the relative desirability of the representative grades from a merchant's or a supply and demand standpoint. In Table 5 is shown a comparison of the values of each of the standardized grades on three different dates, with the percentage of visible waste, as determined by spinning tests conducted by the Department of Agriculture. It will at once be observed that the differences are in every instance greater than the apparent percentage of spinnable cotton. The proportionate amount, however, of spinnable cotton is but one of the factors in determining the comparative spinning value of the grades. Equally important are the bleaching and dyeing qualities, the lower white grades and low tinges and the stains as a rule being much less desirable in this respect than the others. The quality of the yarn produced is quite as important as the percentage of usable cotton, but this element of value, while well known to spinners, is frequently overlooked by those less familiar with this phase of the industry.

TABLE 5.—Comparison of the relative percentage of spinnable cotton remaining after eliminating the visible waste content in certain standardized grades with their relative value according to commercial differences.

[Average of 10 important spot markets.]

Grade.	Relative percentage of spinnable cotton. ¹	Relative value according to commercial differences.			
		May 15, 1916.	July 17, 1920.	July 31, 1922.	July 31, 1923.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Middling Fair.....	102.4	107.6	101.6	108.4	104.2
Good Middling.....	101.6	103.8	106.3	104.4	103.1
Middling.....	100.0	100.0	100.0	100.0	100.0
Low Middling.....	98.6	94.1	78.8	94.2	96.9
Good Ordinary.....	95.9	86.2	61.6	85.9	92.0
Good Middling Yellow Tinged.....	99.8	99.8	94.8	100.1	98.3
Middling Yellow Tinged.....	98.5	96.3	86.9	92.8	95.8
Low Middling Yellow Tinged.....	94.5	90.2	72.2	85.6	91.3
Good Middling Yellow Stained.....	100.0	96.0	88.1	94.2	97.0
Middling Yellow Stained.....	95.8	92.2	79.1	85.9	92.2
Good Middling Blue Stained.....	99.6	95.5	85.1	93.6	95.7
Middling Blue Stained.....	96.4	90.5	77.0	86.3	92.1

¹ Computed from percentages of waste as determined in spinning tests conducted by the department. See Department Bulletin No. 591, Manufacturing Tests of the Official Cotton Standards for Grade, by Wm. S. Dean and Fred. Taylor, and Department Bulletin No. 990, Preliminary Manufacturing Tests of the Official Cotton Standards of the United States for Color for Upland Tinged and Stained Cotton, by W. R. Meadows and W. G. Blair.

The percentage of spinnable cotton is but one grade factor in spinning value. Equally important are other factors which enter into the quality of the yarn and affect its luster, strength, and adaptability to bleaching, dyeing, or mercerizing.

THE VALUE OF STAPLE COTTON.

The premium which any cotton should command because of its extra length of staple is never so easy to determine as are the grade differences. None of the exchanges has undertaken the quotation of staple premiums, though such information is collected and published weekly in the New Orleans and Memphis markets by the United States Department of Agriculture and elsewhere by commercial news agencies.

Because of the general lack of agreement among classers in their ideas of staple strength, it has long been the custom to buy and sell staple cottons on actual samples or on type. In the latter case, each shipper furnishes his customer with a type sample and offers him cotton equal to it, leaving to the customer the privilege of stapling it according to his own notions and of calling the length what he pleases. For convenience of negotiation each type sample is given an identifying mark, sometimes a number of one or more letters.

In computing staple premiums, the basis usually taken is $\frac{7}{8}$ to 1 inch. Cotton less than seven-eighths of an inch in length of staple is not deliverable on future contracts, and in the spot trade there is no appreciable premium over seven-eighths-inch cotton until lengths equal to or greater than 1 inch are reached. From that point, however, for each sixteenth of an inch of increased staple there is a marked increase in the value of cotton. Ordinarily the difference in value between cottons, of which the difference in staple length is only one-sixteenth of an inch, is much greater than that between two consecutive grades of short-staple cotton.

It should be noted in this connection, however, that the grade differences in staple cotton are usually much wider than those in short cotton and that, at least among the upland varieties, the longer the staple the wider the grade differences. The reason is that the longer staples are used in the finer counts of yarns and the finer fabrics. In the spinning of the higher counts of yarns, the cotton is usually passed through combers which, besides eliminating the leaf and foreign matter, remove also an additional amount of waste fibers. In this process the longer staples yield a greater percentage of waste. Moreover, in the finer fabrics, bleaching, dyeing, and mercerization are important considerations. In these processes cotton of bright bloomy color gives the most satisfactory results. Because of these factors in spinning and finishing, the demand for staples usually centers in the grades of Strict and Good Middling, and the lessening desirability of each successive lower grade is marked by wide steps. Below Low Middling the grade discount usually offsets whatever premium value the cotton might have because of its staple, and staple is frequently disregarded.

Staple premiums, like grade differences, may fluctuate widely with the supply and demand of staple cotton as a whole as well as of each respective length (Table 6).

TABLE 6.—A comparison of staple premiums quoted in two large markets for staple cotton.

	Apr. 30, 1920.		Apr. 30, 1921.		Apr. 29, 1922.		May 5, 1923.	
	New Orleans.	Memphis.	New Orleans.	Memphis.	New Orleans.	Memphis.	New Orleans.	Memphis.
Middling upland short cotton ¹	Cents. 41.00	Cents. 42.00	Cents. 11.25	Cents. 11.00	Cents. 17.00	Cents. 17.25	Cents. 26.50	Cents. 27.50
	Points on.	Points on.	Points on.	Points on.	Points on.	Points on.	Points on.	Points on.
1 $\frac{1}{8}$ inches.....	625	600	100	150	150	175	50	Even.
1 $\frac{1}{4}$ inches.....	2,425	2,600	200	400	375	375	100	125
1 $\frac{3}{8}$ inches.....	3,550	4,000	525	700	550	575	150	150
1 $\frac{1}{2}$ inches.....	4,200	4,600	800	(²)	800	875	225	250
1 $\frac{5}{8}$ inches.....	(²)	5,000	(²)	(²)	(²)	(²)	300	(²)
1 $\frac{3}{4}$ inches.....	(²)	5,850	(²)	(²)	(²)	(²)	400	(²)

¹ Cotton Exchange spot quotation.² Nominal.

Exceptionally high premiums prevailed in 1920. Those current in 1921 and 1922 were much nearer the normal. Expressed in percentages of the basis price, the premiums are as shown in Table 7.

TABLE 7.—Staple premiums in two large markets expressed in percentages of the basis price.

	Apr. 30, 1920.		Apr. 30, 1921.		Apr. 29, 1922.		May 5, 1923.	
	New Orleans.	Memphis.	New Orleans.	Memphis.	New Orleans.	Memphis.	New Orleans.	Memphis.
Middling upland short cotton ¹	Cents. 41.00	Cents. 42.00	Cents. 11.25	Cents. 11.00	Cents. 17.00	Cents. 17.25	Cents. 26.50	Cents. 27.50
	Percent-ages on.	Percent-ages on.	Percent-ages on.	Percent-ages on.	Percent-ages on.	Percent-ages on.	Percent-ages on.	Percent-ages on.
1 $\frac{1}{8}$ inch.....	15.2	14.3	8.9	13.6	8.8	10.1	1.8	4.5
1 $\frac{1}{4}$ inch.....	59.1	61.9	17.8	36.4	22.0	21.7	3.8	5.5
1 $\frac{3}{8}$ inch.....	86.6	95.2	46.7	63.6	32.4	33.3	5.7	9.1
1 $\frac{1}{2}$ inch.....	102.4	109.5	71.1	(²)	47.0	50.7	8.5	(²)
1 $\frac{5}{8}$ inch.....	(²)	119.0	(²)	(²)	(²)	(²)	11.3	(²)
1 $\frac{3}{4}$ inch.....	(²)	139.2	(²)	(²)	(²)	(²)	15.1	(²)

¹ Cotton Exchange spot quotation.² Nominal.

From Table 7 it is apparent that staple premiums fluctuate quite independently of the basis price.

SPECIAL CONDITIONS AFFECTING THE VALUE OF COTTON.

In addition to grade, staple, and character, there are still other qualities and conditions of cotton that must be recognized by the classer. Some of them may be expressed in terms of character, but for the most part they are separate and distinct qualities relating as much to handling and baling as to the nature of the lint. Chief among these conditions are those enumerated below:

Reginned cotton.—Reginned cotton has been passed through a gin more than once and, after being ginned, has been subjected to a cleaning process and then baled. Reginned cotton can usually be detected by its velvety feeling, its fluffiness or lightness of body and by its peculiar dull cast when viewed in a good light. Low-grade cotton is reginned for the purpose of raising its grade and

so increasing its value by the elimination of some of the leaf and other foreign matter. Samples which have served their purpose as well as loose cotton, sweepings, and pickings are sometimes reginned and baled, but reginning is a more general practice when the low grades are in unusually large supply and in but little demand.

The objection to reginned cotton is that varying lengths of staple can easily be mixed together in the same bale. Mixed staple is highly undesirable, and as reginned cotton is always open to suspicion in this regard its value is difficult to determine and it can be rejected by the purchaser when tendered on a contract calling for straight cotton. Tests conducted by the Bureau of Agricultural Economics are inconclusive in showing the spinning value of reginned as compared with straight cotton. Some mills, nevertheless, find it suited to their requirements and are willing to buy it for what



FIG. 15.—Cotton grading in its most elementary form. Street buyers examining a farmer's cotton in a southern town.

it is, though usually at a substantial discount from the price of straight cotton of the same grade.

Repacked cotton.—Repacked cotton is composed of factors', brokers', or other samples, or of loose or miscellaneous lots collected and rebaled. Repacked cotton is admittedly mixed cotton. The fact that it is repacked can usually be detected in the sampling. In samples drawn from repacked bales the lint is not in smooth layers as it is in straight cotton, but is noticeably matted and wadded. Upon close examination, the head and sides of a repacked bale present a wadded appearance in contrast with the smooth, even layers of straight cotton.

Mixed-packed cotton.—Mixed-packed cotton shows either a difference of more than two grades between the samples drawn from the heads and from the top and bottom sides of the bale or an equivalent difference in color. The value of mixed-packed cotton is never conceded to be more than the value of the lowest cotton in the bale. Frequently it is not so desirable as even-running cotton of the lowest grade, since all the cotton in the bale may not be

suited to the same work. Mixed-packed cotton is easily detected in ordinary classing. The usual cause of mixed-packed bales is the purchase by ginnermen at the end of the season of remnant bales of cotton of different grades from various farmers and the combining of these remnants in standard 500-pounds bales.

Plated bales.—Plated bales contain on the bottom a thin layer or plate of cotton of different grade or staple from the remainder of the bale. Plating is caused by the failure of ginnermen to run out completely from the breasts of the gin stands all of the cotton of one farmer before beginning to gin the cotton belonging to another farmer, thus causing a plate of different cotton to go into the second farmer's bale. If cotton is properly sampled on both sides, the

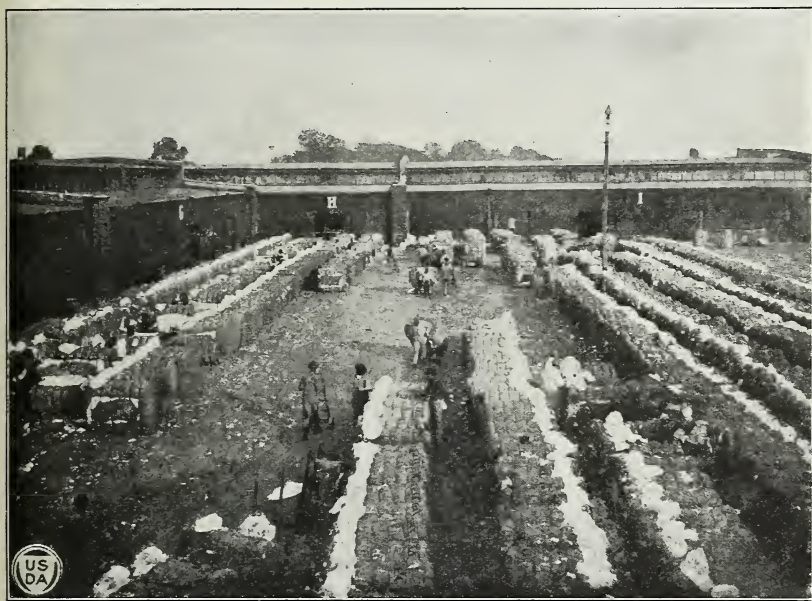


FIG. 16.—Classing cotton at the bale on a compress platform, a common practice in transactions at concentration points. A classer and his helper can be seen between the second and third rows of the lot ranged on the extreme left.

presence and thickness of the plate is easily determined in classing. Plated bales can be conditioned by having the plate removed when the bale is opened for compressing.

False-packed cotton.—False-packed cotton may (1) contain a substance entirely foreign to cotton; (2) contain damaged cotton in the interior without any indication of such damage upon the exterior; (3) be composed of good cotton upon the exterior and decidedly inferior cotton on the interior in such manner as not to be detected by customary examination; or (4) contain pickings or linters worked into the bale.

The false packing of cotton is ordinarily hard to detect in the classing of samples drawn in the ordinary way and frequently is not discovered until the bale is opened at the mill. Bales have been known to be falsely packed with stones, old iron, sand, and other similar substances for the purpose of increasing weight or plated

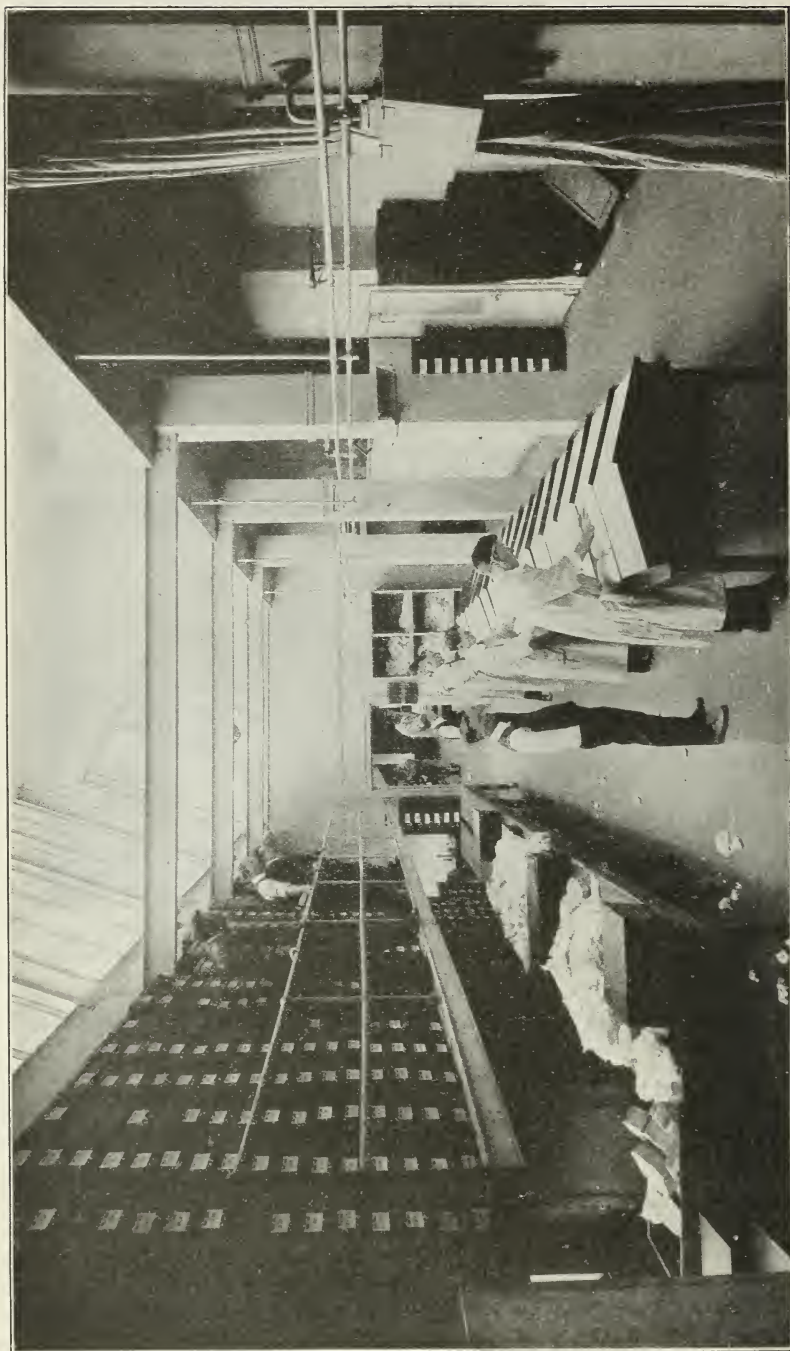


FIG. 17.—Room used for final inspection of practical forms of the Official Cotton Standards of the United States, Bureau of Agricultural Economics, Washington, D. C. The skylight has been taken as a model for the classing rooms of various cotton firms and cotton trade organizations.

to deceive the buyer. A classer may, if he has reason to believe that a bale is falsely packed, decide the question by drawing samples from the interior of the bale with an auger through the head or side. False packing of cotton is not common at the present time, as nearly all of the cotton-growing States have enacted laws making it a penal offense.

Water-packed cotton.—Bales of water-packed cotton have been penetrated by water during the baling process, causing damage to

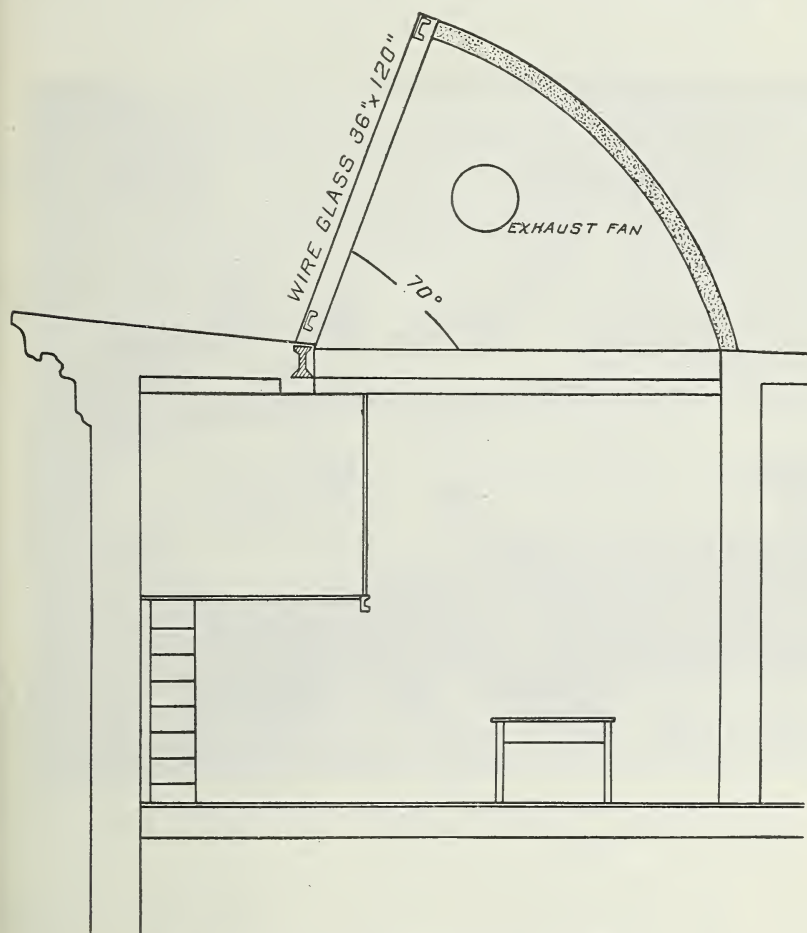


FIG. 18.—Construction of skylight in the grading room.

the fiber or, although apparently dry on the exterior, have been damaged by water in the interior, through being ginned while in a moist condition or through exposure to the weather. If water has been added intentionally in the baling process, water packing is one form of false packing. Most frequently, however, damage of this kind is caused from the condensation of steam in the steam trumper of the gin and the escape of water from the cylinder of the trumper into the press box, or from faulty adjustment of the steam valve

placed in the lint flue for use in case of fire. Water-packed cotton is so damaged and changed in character that it can be noted at once, but if its presence is confined to the inside of the bale it can seldom be detected without the use of the auger in sampling.

Country damage.—Country damage or weather damage is the damage or deterioration of the fiber caused by the absorption of excessive moisture from the exterior, which may result from exposure of the bale to the weather or from storing it on damp ground or floors. Weather damage is easily distinguishable by the discoloration of the fibers and their weakened character. If the damage is



FIG. 19.—Committee of Board of Cotton Examiners of the Department of Agriculture at the New York Cotton Exchange settling the classification of a doubtful bale by reference to the standards.

excessive, the fibers become heavily stained and moldy and matted together stiffly like starched felt. In some cases they may even lose the appearance of fibers altogether. Damaged bales, to be merchantable, must be reconditioned by having the damaged fiber entirely picked off.

Mixed staple.—In cotton of mixed staple most of the fibers are of two or more distinct staple lengths. The cause of mixed staple can usually be traced to the planting of mixed seed, or to mixing at the gin.

Perished staple.—Cotton in which the strength of the fiber, as ordinarily found, is unduly reduced through exposure to the weather either before or after baling or through heating by fire or on ac-

count of water packing or by other causes is said to be perished staple. Perished staple is usually so weak and brittle that it may easily be detected even by classers of little skill or experience.

Immature staple.—In cotton of immature staple the ripening process has been interrupted and the bolls opened prematurely either by frost or drought. Immature staple is usually soft, weak and irregular and is wasty to an excessive degree.

Bollies and snaps.—The term bollies is one that has apparently a variety of meanings in different sections of the Cotton Belt. The word, however, is most commonly used to describe cotton the bolls of which are only partially opened by frost and the burrs of which are picked with the lint and put through a hulling process before being ginned. North and west Texas and Oklahoma are the areas of largest production. Bollies have a low spinning value and their staple is usually immature, weak, and irregular. Other outstanding characteristics are their reddish color, often very deep, and the presence of broken pieces of the burr and of shale.

Snap.—Cotton of which the bolls are matured and opened in the field, but which is picked with the burrs in the same manner as bollies is known as snaps. The lower grades of snaps are not easily distinguished from the better grades of bollies, but as a rule they contain a stronger and better quality of lint. Ordinarily, too, color in snaps is much less red and may even be grayish or bluish, or grey with red spots. Like bollies, snaps represent the last picking of cotton in the field. Not infrequently snaps and bollies are picked together, and it is difficult to determine in which category such cotton should be placed. As a matter of fact it is impossible, without knowing the origin of a bale, to declare positively that it is either snapped or bolly cotton. Both are ordinarily bought and sold by the trade on types or actual samples, and in examining cotton for delivery on future contracts classers of the Bureau of Agricultural Economics do not undertake in any case to decide whether a bale belongs in either category, but grade it according to established standards with such special notation of its character as may be necessary.

Grabbots.—Cotton that is carelessly picked at any time in the season may contain a small percentage of snapped bolls which are rejected with hulls by the gins in the process of ordinary ginning. These bolls and hulls are allowed to accumulate and at the end of the season ginners often put them through their machines like bollies. Gin sweepings are sometimes included. The product, obviously, is lower in value even than bollies and commonly takes the name of grabbots.

SAMPLING AND THE HANDLING OF SAMPLES.

When a sample is drawn from a bale, ordinarily a crescent-shaped cut is made in the bagging between two bands. Several layers of lint are taken from the bale by means of hooks through the opening thus made. To detect mixed-packed and plated bales samples should be drawn from both sides of the bale. A numbered tag is fastened to the bale which usually has attached to it one or two coupons bearing the same number as the body of the tag, and when a bale is sampled

the coupons are torn off and rolled in the sample. If samples are taken from both sides of the bale the coupons are placed between the samples, which are then rolled together.

The outer layers or shell of the bale which come in contact with the ground or wharf frequently accumulate dust and trash. Discoloration of this kind and that caused by rusty ties is known as bagging stain. Care should be taken by the sampler to remove the layers of stained lint to secure a sample truly representative of the bale. On the other hand, equal care should be taken to handle the sample at all times in such a manner as to preserve it from mutilation. Repeated handling of a sample of leafy cotton may easily result in the loss of enough leaf to raise it by a full grade or more. When wrapped or packed together samples should be tightly rolled to prevent the escape of leaf from one sample to another.

It is not usually advisable to attempt to class cotton immediately after it is sampled if the most accurate results are sought. Newly drawn samples should be laid upon a table to "condition" for a period of several hours. When thus exposed, they enlarge somewhat in size and increase perceptibly in bloom or brightness, while at the same time the leaf becomes less noticeable. Especially is this true of samples drawn from compressed bales. If it is necessary to class the samples of compressed cotton immediately after they are drawn it is customary to allow about half a grade on account of compression, but it is preferable to let the samples condition from 24 to 48 hours and then give them their true grade.

Except for such periods of time as are required for a proper conditioning of the samples they should not be allowed to stand exposed to the air. The continued settling of dust on them from the air dulls their color and destroys their representative character. Samples of spotted or tinged cotton especially should be protected so far as is practicable from both light and air, which have the effect of bleaching their color and thus changing their grade.

For the same reasons the boxes containing practical forms of the standards should be kept closed when not in use. The color standards require no conditioning. The boxes representing the white grades are provided with inner covers upon the removal of which the samples are conditioned automatically. It is therefore unnecessary to expose the contents, except when comparisons with actual samples are being made.

LIGHT AND WEATHER CONDITIONS AND THEIR INFLUENCE.

In the primary markets and interior concentration centers a great deal of cotton is classed in the open air at the bale, and to some extent this practice is still followed at the ports. The most accurate classing, however, can be done only under the best of light conditions.

A room with north light, free from shadows, reflections, cross lights, and direct rays of the sun, should be used, if obtainable. If the openings can be so covered that the light is excluded from all but north windows, such a light should be sufficiently good for accurate work. When windows are used, the classer should stand with his back toward the window and view the cotton in the light

passing over his shoulder. The best light obtainable, however, is that from the open sky passing through skylights facing the north. As the direction of such a light is downward there is very little opportunity for the classer to hold the sample in his own shadow. The inside walls of a sample room should be tinted steel gray in order to minimize reflections and to tone the light in a way to make fine differences of color in a sample easily distinguishable. It is impossible, however, even under the best of conditions to maintain uniform light conditions throughout the day and the classer must study carefully the light in which he works and note its peculiarities. More especially is this true when it is impossible to secure the best of lighting facilities. Smoke from adjacent buildings or factories markedly affect the light, while reflections from red or white walls make it deceitful in the extreme.

Seldom is it possible to class cotton indoors accurately before 8.30 or 9 o'clock in the morning or after about 3.30 in the afternoon on clear days. If the sky is dull and cloudy, it may be impossible to work to advantage except for shorter periods. A dim gray or "hard" light gives blue or gray cotton the appearance of being much deeper in color than it actually is. A late afternoon light or a warm glowing light through a thin film of clouds has a "flattering" effect on the appearance of the cotton, especially that which contains some yellow color. Classers are accustomed to take such conditions into account by "discounting" the light. It is extremely difficult, however, even for the most experienced classers to judge cotton uniformly on days when weather and light conditions are variable. For the stapling of cotton it is not necessary to have so good a light as for grading, though some classers hold the opinion that in a dim light the staple of cotton appears shorter than it actually is.

In determinations of staple and character conditions of humidity are far more important than those of light. As cotton readily absorbs moisture from the air, an increase of humidity hardens its break and drag and adds to the measurable length of its staple. The effect of excessive dryness is, of course, the reverse. In the manufacture of cotton, moisture is an important factor and the precise effects of varying degrees of humidity are carefully studied. Even where natural atmospheric conditions are the most favorable, devices are usually installed to increase the dampness of the air, while in regions of dryer climate the use of automatic machinery to produce and control humidity is very successful and almost universal. Some mills, in order to examine their cotton under the same conditions as those under which it is spun, expose their samples for a given time in rooms in which the humidity is kept constant. This, it should be said, is a step in advance of the usual practice of the cotton trade, as most of its members know the effect of moisture in cotton fibers only in a general way. Nevertheless, as the tendency in cotton merchandizing is toward finer discriminations in matters of staple and character, it is quite possible that in the future more careful attention will everywhere be given to questions of moisture.

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